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FRUIT INSECT INVESTIGATIONS

Second brood of curculio in Georgia light.--Oliver I. Snapp, of the Fort Valley, Ga., laboratory, reports that this is the first year since 1923 that the Elberta peach crop in Georgia was not subjected to at least a partial second-brood plum curculio attack. The Elberta is the last commercial variety of peach to ripen in Georgia and therefore the entire crop of Georgia peaches was harvested this year before the deposition of second-generation plum curculio eggs. Second-generation eggs began to form in the bodies of new plum curculio females on July 5, but it was July 26 before any of these eggs matured. The Elberta peach harvest was completed on July 25. The first mature eggs of the second generation were found in the body of a female that emerged from the soil on June 20; therefore the period between adult emergence and the maturity of the first eggs of the second generation was 36 days.

Location of Charlottesville, Va., laboratory.--The new laboratory at Charlottesville, Va., for the study of Comstock's mealybug on apple, is located on Rio Road (Park Street extended) 2 miles from the Courthouse, north. The telephone is Charlottesville 1345-L, and the post office address is Box 171, Charlottesville.

Use of rotary net to obtain flight records of codling moth.--Records of codling moth population in apple orchards have been obtained for some years by means of molasses baits, reports the Yakima, Wash., laboratory. Evidence accumulated, however, that these records did not always give a true picture of the population. A power-driven rotary net has therefore been set up in an apple orchard near Yakima, to obtain records in a different manner. Two nets are in operation, 1 about 10 or 12 feet above the ground and the other near the tops of the trees, swinging as close as possible to 2 adjacent trees. These nets are both on 1 shaft and constructed in much the same manner as nets used at other laboratories (see Jour. Econ. Ent. 32:859, 1939). The cost of constructing the net, exclusive of labor and the motor and gears, which were on hand, was about \$20. It cost an additional \$10 to have the proper electrical connections made, and the cost of operation, with the net running 12 to 14 hours per night, is about \$4 per

month. During the first 30 days of operation, the lower net caught about 1,900 codling moths (very few moths have been caught in the upper net). Two molasses baits, placed in trees about 200 feet away, in opposite directions, have caught about 1,600 and 1,800 moths, respectively; hence the net catches enough codling moths to give a very good idea of the daily fluctuation in moth flight. It is too early to make any statement as to the relative value of the net and of baits for sampling the codling moth population, but it is interesting to note that a single net, rotating past a small portion of 2 trees, is catching more moths than a single, presumably attractive, bait placed in a tree in the same orchard.

Winter survival of raisin moth.--Winter surveys, by D. K. Barnes, C. K. Fisher, and G. H. Kaloustian, of the Fresno, Calif., office, were made in two vineyards in Tulare County during January and February of 1939 and 1940 for the purpose of determining the size of the overwintering larval population of raisin moth. Trapping with malt-sirup bait traps to determine the size of spring emergence followed these surveys. The overwintering larval populations found in 1940 were smaller by 89.4 percent than in 1939. The number of moths taken per trap per day in 1940 showed a reduction of 68 percent, as compared with the number for 1939. A larger percentage of larvae must have survived the winter in 1940 than in 1939. Reduction in the percentage of parasitization was an important factor in the survival. The parasitization among over-wintering larvae was 10.7 percent in 1939 and 3.4 percent in 1940. The most abundant parasite found was Idechthis canescens (Grav.).

MEXICAN FRUITFLY CONTROL

Fruitfly populations decreasing.--In June 1,126 fruitflies were trapped in the regulated area but in July only 229 flies were taken. Most of these were from groves in the western end of the valley, and 108 came from 1 district. Almost all of the flies trapped in this 1 district came from 2 properties which had been heavily infested in the late spring. The trend of the fruitfly population appears to be following that of previous seasons, and it is expected that a low point in the population will be reached in the very near future. Heavy rains early in July materially benefited the rapidly maturing fruit crop and, although the indicated production is somewhat short of last season's, it is expected that the increased size in the fruit will go a long way toward making up the forecasted shortage. Insect damage to the new crop appeared to be limited to a rather heavy infestation of rust mite and a very light infestation of scale.

CEREAL AND FORAGE INSECT INVESTIGATIONS

A second introduced parasite of vetch weevil recovered.--J. S. Pinckney, Carlisle, Pa., reports that during the latter part of May and the first part of June, 7,249 adults of Triaspis thoracicus Curt., a parasite of the vetch weevil, were liberated on a patch of vetch at the Piedmont Experiment Station at Statesville, N. C. Of this number of parasites, 3,901 were males and 3,348 were females. On July 10 a fairly large number of pods were collected from this release area and placed in rearing boxes for issuance of any parasites that might be present in the infested seed. Since July 15 and to date, 55 adults of T. thoracicus have been reared from this

material. This is the first time that recovery in numbers has been made of this parasite from areas of release. Once before, at Arendtsville, Pa., 1 adult of this species was reared from pods collected at a point where approximately 10,000 Triasnis had been released. At about the same time that these releases of Triasnis were made at Statesville similar releases were made at Salisbury, N. C., except that they were all made in June, as the vetch crop there was later than at Statesville. A total of 5,929 adults of T. thoracicus were released, of which 2,567 were males and 3,362 were females. No recoveries have as yet been made from the collection of pods gathered at this point on July 10 and which were brought into the laboratory for rearing. The recovery of an introduced parasite referred to as Te-trastichus sp., liberated in North Carolina last year, has already been recorded.

New distribution record for vetch bruchid.--J. S. Pinckney, Carlisle, reports the following new distribution points for Bruchus brachialis Fahr.: Goodyear, Mechanicsburg, and Carlisle, Cumberland County, Pa., and Martinsville, Henry County, Va.

JAPANESE BEETLE CONTROL

Japanese beetle trapping.--During July trapping continued in 14 States and traps were operated by Bureau workers at most of the field stations scattered about the United States. In the regular trapping program 800 traps were in operation in Athens, Chamblee, Gainesville, and Toccoa, Ga.; 13,069 traps in Chicago, Ill., and its suburbs; and 9,000 traps in 21 cities and towns in Indiana, ranging from 100 traps in Franklin, Noblesville, Portland, and Winchester to 1,200 in South Bend and 2,700 in Indianapolis. In Kentucky there were 1,400 traps--200 in Frankfort and 1,200 in Louisville. Fifteen Maine communities were trapped with a total of 1,400 traps, while in Michigan 6,900 traps were operated in Detroit and its suburbs. Three hundred traps were operated in 4 cities in New Hampshire, and in New York 1,800 traps were in operation in Auburn, Batavia, Canandaigua, Geneva, Newark, and Dansville, all in or near the Finger Lakes section. In North Carolina 7,455 traps were set in 22 cities stretching from Elizabeth City on the Atlantic coast to Asheville near the foot of the Great Smoky Mountains. In Ohio there were 5,200 traps in 17 cities, from Conneaut and Elyria near Lake Erie on the north to Gallipolis and Marietta on the Ohio River in the south, plus 1,500 traps on 3 scattered routes. Seven hundred traps were placed in 3 northwestern Pennsylvania cities, and 1,100 traps were distributed in Florence and Greenville, S. C. In Berryville, Danville, Front Royal, Harrisonburg, Petersburg, and Winchester, Va., 1,200 traps were operated, with an added 600 traps on scattered routes. In West Virginia 300 traps were set up in Moundsville and vicinity.

Certification activities.--A large flower grower near Newfield, N. J., cut gladiolus at the rate of 600,000 stalks per week during July. About 5 percent of the cuttings required certification. The remainder was marketed in New York City and New England. One large central New Jersey nursery abandoned lead arsenate treatments of many of its nursery plots. This firm has a large methyl bromide fumigation chamber. Another grower in the Philadelphia area shipped 10,000 cut lilies per day, with the expectation of later increasing the cutting to 20,000 stalks per day. A total of 431 empty

refrigerator cars were fumigated during August in the Philadelphia area. Inspectors working along the Delaware River in Philadelphia reported that beetles were generally scarce during the month, with the exception of July 29, when numerous beetles were on the wing around floats on which refrigerator cars were being loaded with bananas.

Farm-products inspection in New York City.--Arrangements were made with the New York City department of docks to lease a space at Pier 23, North River, for an inspection platform in the vicinity of Washington Market, where the bulk of the fruits and vegetables to be certified originate. The platform was opened on July 15. Inspectors were assigned to the platform to cover the period from 8 a.m. to midnight. Delayed adult emergence in the New York City area permitted postponement until July 10 of the prefumigation of refrigerator cars used in transporting bananas from that section. Usually beetle flight in the nearby freight yards necessitates such prefumigation by July 1. Refrigerator cars to be used in the transportation of farm products other than bananas were certified on the basis of pre-inspection and screening.

Increased beetle infestation on "Del-Mar-Va" Peninsula.--The district supervisor in Delaware reports that Japanese beetle infestation in that State is much heavier this season and considerable damage has been done to both orchards and vineyards. Beetles have been found in nearly every classified nursery and greenhouse that was formerly uninfested, necessitating actual treatment or inspection of practically all quarantined articles to be shipped to nonregulated points in the future. Heavy infestation was also reported on the Eastern Shores of Maryland and Virginia. Owing to the heavier infestation, rigid screening requirements on trucks and individual carriers of certified products were enforced. From 7,246 hampers of string beans inspected in the Eastern Shore district, 634 adult beetles were removed, most of them from beans inspected near Princess Anne and Pocomoke, Md. Three beetles were removed from tomatoes.

Screening required for certified articles.--Protection for plant material shipped from the densely infested Japanese beetle area in open containers, such as crates or slatted boxes, was required, starting late in June. A 2-week delay in emergence of adults made it unnecessary to impose this added requirement at the inception of the seasonal quarantine on June 15. Certified material en route through areas where beetles are swarming is subject to reinfestation. Accordingly covering of the plant material with cheesecloth or mosquito netting is required for the duration of the beetle flight. The regulations prescribe that quarantined articles moving from or through the regulated areas during the flight season shall at all times while they are in the regulated areas be screened, covered, or otherwise protected in a satisfactory manner.

Japanese beetle scouting.--Scouting of heretofore uninfested nurseries and greenhouses began in Connecticut on July 9, when three crews started operations. Scouting in Rhode Island, Massachusetts, and New Hampshire started July 15, with seven crews assigned to these States. Scouting operations in Maine got under way on July 18. In the few isolated regulated areas in New Hampshire and Vermont scouting is being taken care of by the district

inspectors, who began their surveys on July 15. Scouting in New England indicates about a 2-week delay in the usual emergence dates for adult beetles. Scouting in the New York City area began on July 1.

Increased inspection requests after check-up on common carriers.--Believing that there should be more requests for certification of cut flowers in Albany and Syracuse, N. Y., checks were made by inspectors at express offices, post offices, and bus lines, and the quarantine regulations were again brought to their attention. As a result there was a notable increase in requests for cut-flower inspection.

Farmers meet to discuss Japanese beetle control.--A series of farmers' meetings was held late in July on the Eastern Shore of Virginia for the purpose of discussing methods of control. It was decided that, if State appropriations could be obtained, trapping, spraying, introduction of milky disease, and lead arsenate treating would be advocated.

Long-distance fliers.--A southern New Jersey nurseryman reported that on the week-end of July 24 he took a party from Riverton, N. J., on a fishing trip off the South Jersey coast. He states that on their return trip they encountered a fairly heavy flight of Japanese beetles at an estimated distance of 9 miles off shore. They also saw large numbers of beetles floating on the ocean surface.

Airport inspection.--On July 9 an inspector was assigned to the Philadelphia Airport, in the southern part of the city, to inspect airplanes departing for points in noninfested States. Heavy beetle infestation was reported at the Middletown, Pa., Army Air Base and at the airfield at the New Cumberland, Pa., Army Depot. Trees were sprayed at both of these Army posts.

Catches in city-operated traps.--Reports from the Springfield, Mass., Park Department state that by the end of July they had trapped 361,000 Japanese beetles in 1,650 traps set in the city. The first beetle caught was taken from a trap on June 27. Catches on July 30 numbered 27,000 trapped and 14,000 hand-collected by the 9 men tending the traps.

Plant quarantine mentioned in funeral notice.--During the month there appeared in one of the Boston newspapers a notice of a funeral to be held in Brookline, Mass. The body was to be sent to New York City for interment. The final sentence of the notice read, "Flowers require Federal certification." The principal items of funeral flowers that require Federal gypsy moth inspection when moving to noninfested points are woody plants, such as laurel, used as background material in sprays and wreaths. Many of the florists have revised their method of constructing set pieces so that Oregon huckleberry, an exempt product, is used for a floral backing on pieces going out of the regulated zone.

Infestations removed by inspectors.--The total removals from 60 of the hundreds of lots of products inspected, numbered 346 larvae, 147 pupae, and 2 egg clusters. Forest, nursery, evergreen, and stone and quarry products were included among the infested items. Fourteen larvae and 20 pupae were

removed from 4 cords of birchwood inspected prior to its manufacture into novelties for later shipment to points outside the gypsy moth regulated area.

Lumber moves in quantity.--Large quantities of lumber were certified during July, especially from the districts of Portland, Maine, and Concord, N. H. Owing to the large volume of shipping, it was necessary to assign an extra man in each of these districts. Over a million board feet of lumber was certified for shipment from the district of Rochester, N. H., and 85 larvae and 53 pupae were removed from 11 carloads of lumber shipped from Concord, N. H.

Lumber infested for testing egg-removal machine.--A quantity of lumber was borrowed during July from the New England Lumber Salvage Project of the U. S. Forest Service and stored in the city-owned quarry grounds in Portland, Maine, where the boards soon became infested with gypsy moth pupae. After the egg-laying season the infested lumber will be run through machines designed to remove egg clusters.

Increased certification of feldspar.--There was a considerable increase in the demand for the inspection of stone products, particularly of feldspar, in the Portland, Maine, district. It is understood that feldspar is now in demand because of its content of beryl, from which the element beryllium is extracted. Greater demands for this element by the airplane industry is causing the quarrymen to increase their output of feldspar.

Different stages of gypsy moth observed.--Occurrence of different stages of the gypsy moth, as reported by the district inspectors throughout the New England States, was as follows: First pupae noted, Weymouth, Mass., July 5; Baldwin, Maine, July 17; first moths seen, Chelmsford, Mass., July 22 (male); Boston, July 25 (female); first egg clusters noted, Nashua, N. H., and Middleton, Mass., July 22.

Preserved Christmas trees now being shipped.--A concern temporarily located at Littleton, N. H., requested certification of treated fir trees and boughs. This material had been dipped in a solution that acts as a preservative and removes all color from the needles. The material was shipped to Florida, where it will be dyed for use as decorations during the Christmas holiday season.

Reduction in Dutch elm disease confirmations in July.--Comparable scouting activities in representative sections of the Dutch elm disease area indicate that the actual number of diseased trees in 1940 is less than of those discovered in 1939. On a work-area basis the figures of the 2 years cannot be compared, inasmuch as scouting was started a month later this year than in 1939; the number of men assigned to scouting this year is less than half the number in 1939; the greater part of the 1940 scouting is performed by scouts in automobiles instead of the previous systematic foot scouting; the scouting is concentrated in the border zone outside the known disease area and very light scouting is being carried on in the disease area; and, finally, very cool weather and adequate rain in most of the area has kept the elms in very good condition so far as wilt symptoms are concerned. It is in only about 5 percent of the area, surrounding known concentrations

of the disease, that systematic foot scouting is under way this year.

Interruption in W. P. A. Dutch elm disease eradication activities.--Pending an allotment of emergency relief funds, the entire W. P. A. personnel was terminated on June 30 until further notice. Field activities during the absence of the security-wage workers were continued by per diem scouts and appointed personnel. W. P. A. workers were recalled in New Jersey on July 8. Work was not resumed by the W. P. A. force in Connecticut and New York until July 15, and in Pennsylvania the men did not report for work until the end of the month. There were 2,096 W. P. A. workers on the rolls at the end of July, and 70 of these were supervisory employees paid from W. P. A. funds on a per annum rate. Five hundred and fifty-six per diem scouts on regular funds, 95 Civil Service appointees, and 59 cooperative State employees completed the Dutch elm disease force.

Elm leaf beetle damage masks Dutch elm disease symptoms.--Elm leaf beetle damage became evident during July throughout the Dutch elm disease work area. It was particularly severe in certain sections. Where the damage was heavy, the leaves were left browned, rolled, and dropping, and wilt symptoms were largely obscured. Japanese beetle feeding also added to the foliage damage in many areas. Heavy elm leaf beetle feeding was noted in a number of locations in Connecticut.

Scolytus multistriatus.--A build-up in the population of this species was noted in the Maryland Dutch elm disease work area. Presence of the beetles was noted for the first time in the Massachusetts work area. Here the beetles had emerged last year and no new galleries were found, although an extensive search was made in the vicinity. S. multistriatus adults were collected in Bedford County, Pa., along Evitts Creek, about 5 miles north of the Maryland State line. This is the first record of these insects having been collected in this county. They were found in logs that had been cut for pulpwood.

Isolated disease concentration found in New York.--North of the Chenango-Broome County line in New York flagging characteristic of Dutch elm disease infection was noted in a number of elms. Elm leaf beetle damage in sections of this area is quite a hindrance to scouting work. The foliage, other than that damaged by the beetle, is generally in good condition. Some of the elms that were affected by the severe drought last year are beginning to show signs of yellowing.

Systematic scouting extended in Athens County, Ohio.--Finding of elms infected with the Dutch elm disease fungus in the western extremity and the south-central extremity of the systematic-foot-scouting area in Athens County, Ohio, led to the addition of several townships to the Ohio work area. One confirmed tree was discovered in Waterloo Township and the other in Lodi Township, in Athens County.

FOREST INSECT INVESTIGATIONS

Copper sulfate solution quickly absorbed by living elm trees.--R. R. Whitten, of the Morristown, N. J., laboratory, submits the following note in connection with his elm-tree-injection studies. It concerns the amount of chemical solution an elm tree will absorb in a given length of time. A

standing, living tree measuring 9.8 inches d. b. h., was injected with a solution consisting of three parts of water and one part of copper sulfate, by weight, on July 22. The collar method of injection was used. In this method the outer bark is first shaved off of an area encircling the tree at breast height. Then a kerf is made around the tree about one-third of the way up from the lower edge of the smoothed area. The kerf is made by repeated chisel cuts through from three to four annual rings. Finally, a piece of waterproof material is attached to the tree just below the kerf so as to form a receptacle capable of holding the liquid to be absorbed through the kerf. Mr. Whitten found that the tree used in the experiment absorbed 13,550 cc. of the liquid in $5\frac{1}{2}$ hours. The rate of absorption ranged from 195 to 1,410 cc. per 15-minute interval. After $5\frac{1}{2}$ hours the entire crown of the tree was a dark brown color, owing to the action of the copper sulfate.

Studies of elm insects as possible vectors of phloem-necrosis disease.--D. E. Parker, Columbus, Ohio, reports that the phloem-necrosis disease of elm is now producing striking symptoms on large numbers of elm trees in Columbus and other localities in Ohio. July was much below normal in rainfall and a 2-week hot spell seemed to speed the action of the disease. Intensive studies are being made of various sucking insects which may possibly act as vectors of this virus disease. Large numbers of several species of fulgorids, cicadellids, cercopids, and aphids have been taken while feeding on diseased trees and have been placed in test cages with healthy trees in an effort to find the species that may transmit this disease from one tree to another.

Mountain pine beetle broods destroyed by penetrating sprays.--J. C. Evenden, of the forest-insect laboratory at Coeur d'Alene, Idaho, reports that the experimental control project conducted on the Wasatch National Forest in June 1940 as a test of the practicability of penetrating sprays as a means of controlling the mountain pine beetle in lodgepole pine proved highly successful. Although the trees were large, with extremely thick bark, all insects were destroyed except under bark that had not been properly sprayed. Final cost data are not available at this time; however, the cost will be less than that of the burning-standing method now employed in this region and the results will be more satisfactory. Furthermore, the danger and extra expense associated with the use of fire are eliminated.

Larval disease prevalent in spruce sawfly infestations in southern Vermont and New Hampshire.--P. B. Dowden, of the New Haven, Conn., laboratory, reports as follows on the European spruce sawfly: "Most feeding by first-generation larvae of the European spruce sawfly (*Gilpinia polytoma* Htg.) was completed in southern Vermont and southern New Hampshire by the last week in July. Larval disease was very prevalent in southern Vermont, and many areas which were expected to be defoliated showed only slight feeding. There was also a general reduction in infestation throughout the severely affected area in New Hampshire. In both sections, however, a considerable number of first-generation cocoons have been formed at some points."

Recovery of outstanding tachinid parasite of gypsy moth introduced from Central Europe.--W. F. Sellers, New Haven, Conn., reports that

Parasetigena silvestris R. D., formerly known as Parasetigena segregata of authors (nec Rondani) and Phorocera agilis of authors (nec Robineau Desvoidy), was recovered during July from several collections of full-grown gypsy moth larvae in very encouraging numbers. In Europe, P. silvestris is the most important dipterous larval parasite of the gypsy moth, commonly destroying 35 percent of this host when it occurs in epidemics. This parasite was colonized in New England in 21 areas between 1924 and 1933. Collections of gypsy moth larvae were made at 5 localities where possibilities were favorable. Results were as follows:

Locality	Date (June)	Larvae collected:	Parasites recovered			
			<u>P. silvestris</u>	<u>Compsilura</u>	<u>Sturmia</u>	<u>Hyposoter</u>
			:concinnata:	:scutellata:	:disparis	
			Number	Number	Number	Number
Massachusetts:						
Wilmington----	26	3,000	1	42	1	1
Boxford-----	27	5,000	114	113	61	4
Ipswich-----	27	3,000	131	41	1	7
Chelmsford----	28	3,000	103	42	1	5
Acton-----	28	2,000	16	35	54	-

Boxford, Chelmsford, and Acton are former colonization points. Intermittent attempts were made to recover this parasite in previous years, and it was found in insignificant numbers at Boxford, Ipswich, Wilmington, and Acton. P. silvestris is a valuable parasite in Europe and its recovery in such encouraging numbers indicates that it should prove to be an excellent addition to the gypsy moth parasites already established in this country.

Two promising European tryphonine parasites of European spruce sawfly.--W. F. Sellers, New Haven, Conn., states that the following Exenterus material was reared during June and July from approximately 10,000 cocoons of the European spruce sawfly (Diprion polytomum (Htg.)) collected last fall by Canadian entomologists at Parke Reserve, Quebec, Canada, and hibernated at New Haven, Conn. One hundred and eighty males and 195 females of Exenterus marginatorius F. and 119 males and 174 females of E. claripennis Thomson emerged from the sawfly cocoons. E. marginatorius and E. claripennis are common hymenopterous larval parasites of the pine sawfly (Neodiprion sertifer Geoffr.) in Europe. Both species have become established on the European spruce sawfly in Canada and they show considerable evidence of being useful parasites in the biological-control program being conducted against this insect. Twenty, or roughly 10 percent, of the E. marginatorius females were mated under laboratory conditions. Previous attempts to mate this species have been unsuccessful. Two hundred and fifty cocoons have been obtained from sixth-instar spruce sawfly larvae successfully attacked by 17 of the mated females. This progress in attempting to propagate this species under laboratory conditions is attributed to the freshness of the material obtained from the imported spruce sawfly cocoons. Improvements in the technique of mating these species offer considerable promise that propagated material can be used to supplement the colonies obtained from field-collected cocoons as a means of distributing these Exenterus parasites in the United States.

Insect damage to hurricane-felled white pine.--Henry A. Bess, New Haven, Conn., reports that logging operations in white pine timber, blown down in New England by a hurricane in September of 1938, are still going on in a number of places where the timber has not been too severely damaged by insects. During the first part of June a survey was made in a few hurricane-felled stands of white pine near Winchendon, Mass., and about 70 percent of the procumbent trees in certain stands were found to be green and free from attack by bark beetles or borers. Observations made the first week in July indicated that there had been practically no change in the condition of the trees during June.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Regular gypsy moth field employees in New England carry on.--No WPA gypsy moth work was performed during the first part of July because of the termination of the services of all W. P. A. employees engaged in gypsy moth work in Connecticut, New York, and Pennsylvania, and the suspension of the workers in Vermont and Massachusetts. Regular gypsy moth field employees carried on as much work as possible during this period but the work was drastically reduced. Frequent heavy thunderstorms during the first week in July necessitated almost daily patrols of temporary wire fences erected around sprayed areas. Regular and careful examinations of the fence lines is necessary, particularly following severe storms or high winds, as the use of fish oil as an adhesive in the arsenical-spray solution causes the poison to adhere to the foliage throughout the growing season. Unfortunately, because of the unusually large number of infestations banded this year and insufficient labor, it was necessary to confine the patrol work to localities where the greatest number of gypsy moth larvae could be readily found.

W. P. A. gypsy moth work resumed in four States.--W. P. A. project applications for gypsy moth work in Connecticut, Massachusetts, and Vermont were approved near the middle of July and work was resumed in those States on July 16 and 17. The project application for gypsy moth work in New York was not approved until the latter part of the month, and work was resumed in that State on July 29. There was some difficulty in obtaining the desired number of men in New York, owing to the assignment of former gypsy moth employees to other projects after the termination of gypsy moth work at the end of June.

Resumption of gypsy moth work in Vermont.--When W. P. A. gypsy moth work was resumed in Vermont on July 16, crews took up scouting where it had been discontinued at the end of June in Stowe Township, in Lamoille County, and in Lowell Township, in Orleans County. Men returning to work in central Vermont were detailed to patrol burlap bands at infested locations in the townships of Bristol, Middlebury, and Salisbury, in Addison County, and also in Brandon Township, in Rutland County. Gypsy moth larvae were found at several of the infestations in these three townships, and it was evident from the size of the caterpillars that feeding will continue well into August. Another crew was assigned to applying burlap bands to trees in Pownal Township, Bennington County, in the southern part of the State. A member of the scouting crew in Stowe Township, Lamoille County, found and killed a gypsy moth caterpillar under a loose

piece of bark on the trunk of an apple tree near the edge of a wood. An intensive examination of all tree growth and ground litter within a wide radius of the infested apple tree failed to disclose any further evidence of the presence of the insect. The woodland near the spot where the caterpillar was located provides little growth favorable for the development of gypsy moth larvae. This is the first discovery of infestation in Stowe since 1923, when a careful scouting of the town revealed four single egg clusters.

W. P. A. gypsy moth work resumed in Massachusetts.--On the resumption of W. P. A. gypsy moth work in Massachusetts on July 17, the work was confined chiefly to the application of burlap bands to trees at small infestations that had not been sprayed in June and to the patrolling of banded areas. Field observations indicate that the caterpillar season will extend well into August, although some pupae were found during the latter part of July, thus prolonging the period during which the burlaps may be patrolled with satisfactory results. Supervisors in Massachusetts and Connecticut report that the number of larvae found seems unusually small, considering the great number of egg clusters found in the winter and early in the spring that could not be completely creosoted because they were broken.

Scouting and burlapping work resumed in Connecticut.--Unskilled workers were detailed on July 16 to apply and patrol burlap bands at scattered infestations in the barrier-zone area of Connecticut, while workers in the intermediate grade began scouting in areas that had not been examined for some time in the townships of Cornwall, Norfolk, Goshen, and New Milford, in Litchfield County. Scouting was also resumed in woodland in the vicinity of the infestations found in Southbury, New Haven County, during the fiscal year 1940.

Gypsy moth activities greatly reduced in Pennsylvania.--Regular gypsy moth field employees in Pennsylvania carried on as much gypsy moth work as possible during July, when all W. P. A. gypsy moth work was terminated pending the approval of the project for the fiscal year. They received assistance with the mechanical work in the repair shop and in the field in Lackawanna and Luzerne Counties from a small force of National Youth Administration employees. The field work of the N. Y. A. employees was restricted chiefly to the patrolling of burlapped infestations and the inspection of temporary fences around sprayed areas adjacent to their assembling points, under the supervision of regular gypsy moth agents, in Pittston, Jenkins, and Plains Townships, in Luzerne County, and in Lackawanna, Scranton, and Roaring Brook Townships, in Lackawanna County. It was impossible to examine all the burlapped trees, patrol fence lines, and perform various other required duties in the outlying counties where no N. Y. A. workers were employed. Funds for the resumption of W. P. A. gypsy moth work in Pennsylvania had not been provided by the end of July. At the end of the month regular field employees were busy placing assembling cages in townships where there was no opportunity to conduct intensive scouting, but in which the existence of gypsy moth infestation is questionable.

C. C. C. gypsy moth scouting and thinning work for 1940.--C. C. C. gypsy moth work was done from 5 camps in Massachusetts and Connecticut at the beginning of the fiscal year 1940, with a daily average of 167 enrollees

available, but this number had increased to 8 camps in Massachusetts, Connecticut, and Vermont at the end of the year, with a daily average of 367 men working. These men used 70,630 6-hour man-days on gypsy moth work during the fiscal year, while 51,817 man-days were taken from gypsy moth work and used in reducing the fire hazard in the forests. While there was a reduction in the number of hours used on gypsy moth work of approximately 42 percent, the loss of time compares favorably with that of the previous year. C. C. C. work was done on slightly more than 129,000 acres of woodland and open country in 41 towns, all of which were found to be infested. Approximately 23,000 of these acres were in open country, the remainder being mainly woodland, 1,708 acres of which were thinned. The latter figure includes areas where sprouts were removed in the course of following up thinning work done in previous fiscal years. New gypsy moth egg clusters destroyed by creosoting totaled 775,355, and an estimate of 720,950 egg clusters were destroyed by burning. The totals for egg clusters destroyed are obtained by actual count in lightly infested areas and by estimates where the infestations are heavy. Of the egg clusters destroyed, 344,988 were located in Vermont, 289,018 in Massachusetts, and 862,299 in Connecticut.

Gypsy moth burlapping done by C. C. C.--The season during which gypsy moth burlapping work is done covers parts of two fiscal years; therefore, the report for the fiscal year 1940 includes the latter part of the work done in 1939 and the first part of the 1940 season. The report for the fiscal year 1940 shows that 266,458 trees were burlapped, and that 311,454 gypsy moth caterpillars and pupae were destroyed at the bands. During the calendar year 1939, 191,495 trees were burlapped, which resulted in the destruction of 980,588 gypsy moth caterpillars and pupae. The report for the calendar year 1940 shows that, up to the end of July, 153,489 trees on 603 acres were burlapped in Massachusetts, 91,793 trees on 244 acres in Connecticut, and 35,295 trees on 201 acres in Vermont. This work resulted in the destruction of 84,727 gypsy moth caterpillars and 587 pupae in Massachusetts, 45,841 caterpillars and 1,322 pupae in Connecticut, and 132,525 caterpillars and 665 pupae in Vermont. Not so many insects have been killed this season as in some previous years, owing in part to a lack of men available for the work and in part to the fact that burlapping work was started from 2 to 3 weeks later than usual this season, as the cold, wet weather in the spring retarded the development of the insect.

C. C. C. gypsy moth spraying report.--Exhaustion of available spraying materials caused the termination of C. C. C. gypsy moth spraying work on July 2 in Massachusetts and on July 8 in Connecticut. Spraying could have been profitably continued to the middle of July if sufficient arsenate of lead and fish oil had been on hand, as the caterpillars were still active at that time. The C. C. C. spraying work covered 1,243 acres in Massachusetts and 1,573 in Connecticut. No C. C. C. spraying was done in Vermont.

C. C. C. gypsy moth work during July.--There was a sharp reduction in man power available for gypsy moth work at the beginning of the work in July, as compared with the average weekly quota for June. This was due partly to the end of an enrollment period, when experienced enrollees leave the camps and the new men must be trained before participating in active work, and partly to the return to their original camps of men who had been transferred to camps doing seasonal spraying work. However, the gypsy moth crews gradually returned to their normal strength as the new men were assigned to actual work.

The efforts of the available force were concentrated mainly on burlapping work, although some thinning, scouting, and spraying was done during the month. In normal seasons efforts are made to finish the spraying work during the last week in June, but the abnormal conditions this year enabled the work to be continued into July.

Gypsy moth infestation reduced in Massachusetts and Connecticut.--Observations in the area between the barrier zone and the Connecticut River in Massachusetts and Connecticut indicate that there has been an important natural reduction in gypsy moth infestation in that region. No severely defoliated areas were noted, although numerous scattered infestations were reported in areas that had not been sprayed. However, defoliation has been reported at several locations in the central and eastern parts of Massachusetts. The reduction in gypsy moth population is partly due to the killing of many caterpillars and pupae by the "wilt" disease toward the end of the 1939 caterpillar season, to parasitization by other insects, and to the feeding of the imported Calasoma beetle, which aided greatly in reducing the infestation in many areas. While field observations and hatching records showed very little winter mortality this year, it is probable that the unfavorable weather this spring was instrumental in causing the death of many of the caterpillars. Large areas of defoliation were noted in Vermont and New Hampshire, with particularly severe defoliation in Westminster, Rockingham, and Springfield. Several large white oaks were approximately 75-percent defoliated, and female moths were beginning to deposit their egg clusters on these trees.

Qualification ratings of C. C. C. enrollees.--Since the beginning of C. C. C. gypsy moth work east of the barrier zone in New England, in June 1933, the gypsy moth foremen have been required to supply the Federal gypsy moth office with termination of employment reports for enrollees who had worked a minimum of 4 weeks. These reports form the basis for determining the qualifications of the men for this type of work. The enrollees are rated in 5 classifications--best, special, excellent, good, and fair. Those rated as "best" are high-grade employees, usually high-school graduates or with even more advanced education, who displayed special interest in the work and who had ability as leaders. In most cases these men are recommended for reemployment as foremen. Those listed under "special qualifications" are men who are experienced in the work, perform their duties well, and are especially proficient in some branch of the work, such as spur or rope climbing or chopping with axes, or were good leaders and generally helpful to the foremen. The enrollees in the "excellent" and "good" classifications are men who are experienced, have shown an interest in their work, and have displayed an ability to perform their duties well. Many of the enrollees rated as "fair" are men who performed gypsy moth work for only a short period and who would probably develop into good workers with longer experience. Men who are not trustworthy, who are lazy, or who have physical handicaps, such as weak legs or body or poor vision, are not recommended for reemployment on this type of work. Practically all of the men in the higher classifications have worked in heavy infestations, have had experience in all types of gypsy moth control work, and have taken courses of instruction in gypsy moth work. The rating of slightly more than 6,800 C. C. C. enrollees who have done gypsy moth work under the supervision of this Bureau in New Hampshire, Vermont, Massachusetts, and Connecticut has been completed for the period from June 1, 1933, to March 1, 1940. Of this number 143, or approximately 3 percent, were

given the "best" rating; 871, or over 12 percent, were rated "special"; 3,538, which is nearly 52 percent, were rated "excellent" or "good;" and 748, or approximately 11 percent, were classed as "fair." The totals show that 5,300, or about 78 percent, of the enrollees were recommended for future employment, leaving 1,529, or about 22 percent, who were not recommended for reemployment on this type of work.

PLANT DISEASE CONTROL

Identification of stem rust specimens.--By August 1 more than 1,500 collections of stem rust had been obtained from representative grain-growing areas throughout the United States and Mexico. Determination has been made of 221 isolates from these collections and about 350 more are in the process of being identified with respect to the particular races of the fungus present. The total number received includes 306 aecial collections on barberry, from which 99 isolates of Puccinia graminis tritici have been made, 31 of P. graminis secalis; and 12 of P. graminis avenae. From the 9 collections of the wheat stem rust that have been identified in aecial material, 7 different physiologic races have been identified, almost as many as were obtained from the 120 uredial collections that have thus far been identified. Races 56 and 17 predominate in the uredial material obtained in the United States, together constituting 66.6 percent of the total number of isolates. From these isolates a total of 8 races has been identified. Work with the collections made in southern Mexico is nearly complete and, of the 94 determinations made, races 38 and 59 appeared in 82 percent of the isolates. Collections from northern Mexico, over half finished, so far show a predominance of race 17.

Severe rust damage limited to small areas.--Wallace Butler reports: "Unlike the wheat stem rust epidemic of 1935, when highly uniform infection progressed continuously in a wide sweep from Texas to Canada, the one of 1940 was much localized, sometimes apparently in a reverse order. In Texas, although the earliest infection developed in the San Antonio area, the heaviest stem rust found early in May was in the area north of Dallas. At the same time central Texas had little stem rust, early drought having prevented heavy infection there. In Oklahoma stem rust became heavy on late wheat in the area west of Kingfisher, while wheat north of it, in the Alva-Pond Creek area, had escaped damage by earlier maturity. In Kansas most fields in the northern part of the State were maturing on June 16 and escaping rust damage, while a large proportion of the fields in east-central and south-central Kansas were still immature and were thus subject to a heavy rust attack, both because of lateness and because of nearness to the source of inoculum to the south. In North Dakota the development was also erratic. Durums, which are frequently free from rust, were the varieties that caused concern this year; furthermore, the only continuous uniform infection found this year was in the Ceres area in the extreme west, whereas in preceding years the eastern part of the State has been the storm center. This difference was due, of course, to the predominance of resistant varieties now being grown in eastern North Dakota. Even within a rusted area there was much variation in the amount of stem rust in different fields owing to varietal reactions and degree of maturity. This localization of areas, and within areas, made loss estimates difficult. The following method was used in estimating: A large number of small samples of wheat were collected at random from the fields of a county. These were taken to the laboratory and

graded as to kernel weight, as compared to a normal or undamaged sample. This so-called normal sample was a composite representing the average weight of a number of unruined samples of the same type of wheat. The weight of 100 kernels of the sample, as compared with the weight of 100 of the standard, was taken as the approximate ratio of the number of pounds of wheat that would be marketed from a field, as compared with what would have been obtained from the field had there been no rust. When this is done with a sufficiently large number of samples to get an average county loss, and weighted for county production, the bushel loss by counties and for the State may be obtained objectively and with a fair degree of accuracy. This, however, does not give the economic loss, which is higher than loss in weight alone because of grade and price reduction on damaged wheat. Although drought, high temperatures, and resistant wheats hampered the development of stem rust in 1940, the elements of an epidemic were there. No wheat examined this year, including Hope, was entirely free from stem rust."

Blister rust kills white pine in Maryland.--It has been known for a long time that blister rust kills white pine. As most of the studies on this subject were made in Europe, New England, and the Northwest, it was decided to make observations in Maryland. These studies were begun in 1937 in Garrett County and have been continued to date. One plot covering 1 acre was established on the south side of the Oakland-Cranesville Road, about 100 yards east of Toliver Run, and another covering 3 acres near the west end of Deep Creek Lake. Fifty-five trees ranging in height from 1 to 15 feet, averaging 3.4 feet, were on the 1-acre plot. The original infection occurred in 1930 and the first tree was killed in 1937. When the last observation was made recently all of the trees were diseased and 43, or 78.1 percent, were dead. A total of 711 cankers, or separate infections, were found. They ranged in number up to 46 per tree, with an average of 12.9. One hundred and ninety-seven trees were found on the 3-acre plot, ranging in height from 1 to 18 feet, and averaging 4.5 feet. Two trees on the area were 30 or more feet in height and, being too large to examine thoroughly, were not included in the study. The original infection occurred in 1931 and the first trees died in 1938. At present 190 trees, or 96.4 percent, are diseased, and 52, or 26.4 percent, are dead. A total of 2,627 cankers were found. The largest number of cankers per tree was 318, with an average of 13.8 for all diseased trees. On and immediately surrounding both of these plots wild gooseberries and skunk currants were present at the rate of several hundred per acre. It is believed that the disease first entered the county about 1924. It is now generally distributed throughout Garrett and western Allegany Counties. Scattered infections have been found on white pines or Ribes in all of the counties in Maryland west of the Chesapeake Bay except Anne Arundel, Charles, Howard, and St. Marys. Owing to the time required for this work no other detailed studies were made in Garrett County. Less-detailed observations indicate that there are other centers of heavy infection, particularly at Crab Run near Grantsville and on the south branch of the Casselman River near Bittinger. The disease is generally distributed throughout the white pines around Deep Creek Lake, where it represents a serious menace to these valuable ornamental trees, unless the wild Ribes are removed. In like manner cultivated currants, gooseberries, and flowering currants are a distinct menace to native or planted ornamental white pine trees. One case was observed in Mountain Lake Park, where cultivated red currants spread the rust to ornamental white pine. In this case the infected parts of the trees were promptly pruned out and the bushes destroyed to prevent further infection. In those sections

of the State where the pine was protected by the removal of the gooseberry and currant bushes the spread of the disease is practically negligible. The removal of the Ribes prevents further infection of the trees but does not prevent those trees already infected from dying. In some sections of Garrett and Allegany Counties wild gooseberries and currants are absent or relatively few in number; while in other localities they are so numerous that it is impractical to attempt to grow white pine.

More infection on limber pine in Northwest.--Following publication in the July 1, 1940, issue of the News Letter (v. VII, No. 7, pp. 16-17) of an item stating that the first known infection on limber pine in the Northwest was found on May 31 in the Savenac Nursery at Haugan, Mont., F. O. Walters, blister rust control supervisor of the Kaniksu operation, reported an earlier discovery in this region. This consisted of two trees found this spring by Mr. Walters in the new University of Washington arboretum nursery in Seattle. Concerning the associated Ribes, Mr. Walters reports: "I was informed that all Ribes had been removed from in and around the arboretum, but a search nearby turned up two bushes which probably are Ribes speciosum, the fuchsia-flowered gooseberry."

Forest fires slow control work in Northwest.--Striking with unprecedented fury, "dry lightning" storms swept the northern Idaho and western Montana forests during July to set an all time high of over 2,300 fires, more than 1,300 of which came in 1 10-day report period. With all forests tinder dry from a rainless period of nearly 1½ months, every forest worker was pressed into fire duty to meet this daily bombardment of "strikes." Throughout this area the bulwark of defense was the large number of regular, C. C. C., and W. P. A. camps on blister rust control, a total of about 4,000 men, including many of the best fire foremen, smoke chasers, and fire crewmen available. The fact that most of the fires were confined to areas of less than 10 acres gives evidence of the efficiency with which this situation was handled. During this period rust-control work was almost at a standstill on most forests. Crews returning from 1 fire would be dispatched to another after only a few hours' rest. This siege will undoubtedly result in a reduction of control work to not more than half the anticipated production for July.

Ribes "fruiting" heavy in Northwest.--The Indians say, "much berry, much cold." If this be true, the Northwest is in for a record winter for all native plants are heavily laden with fruits. In this list are serviceberry, wild cherry, thimbleberry, raspberry, Oregon grape, huckleberry, elder, and Ribes. Of the latter extremely heavy fruit crops have been noted on Ribes viscosissimum, R. lacustre, R. petiolare, R. cereum, and R. setosum. Taking advantage of this situation, several seed collections have been made for experimental testing.

COTTON INSECT INVESTIGATIONS

Cultural practices for control of the pink bollworm.--Variety tests conducted by S. L. Calhoun and O. T. Robertson at the Presidio, Tex., laboratory in 1939 confirmed the previous results that there was no resistance to pink bollworm attack exhibited by any variety tested other than an evasion of a portion of the intense late infestation through early maturity. Closer

spacing of plants between rows and in the drill has been generally used for reducing the size of the plants and hastening maturity for lessening the weevil damage but, as the boll weevil does not occur in the Big Bend area heavily infested with the pink bollworm, this practice has not been used in that area until the last few years, after experimental work had demonstrated its value against the pink bollworm. In the 1939 spacing tests the plants were thinned to 12, 16, and 20 inches in the drill, with 1 and 2 plants left per hill in each spacing. The average earliness, as measured by the percentage of the crop gathered at the first picking, was higher in all cases with 2 plants per hill than with 1, ranging from 1.69 percent greater in the 12-inch spacing to 9.8 percent in the 20-inch spacing. The total yield was larger in the 12-inch than in any of the other spacings, whether there were 1 or 2 plants left per hill, with the highest yield from 2 plants per hill. The average number of cotton plants per acre in the Presidio Valley has increased from about 7,000 to over 9,000 since 1935 but the records indicate that from 16,000 to 20,000 would give better results under pink bollworm conditions. Farmers of the Big Bend generally delay the first irrigation from 8 to 10 weeks after planting, in the belief that the drying out of the soil will cause deeper penetration of the roots. Experiments in 1939 show that this practice stunts the growth, delays the maturity of the crop, and reduces the yield. One series of plots was irrigated 35 days after planting and repeated when about 50 percent of the moisture had dried out, so there was always sufficient moisture for rapid plant growth, or a total of 6 irrigations; a second series was irrigated 64 days after planting when the first plants showed wilt at 3 p. m., or a total of 4 irrigations; and a third series was irrigated 79 days after planting when the first plants showed wilting at 8 a. m., or a total of 3 irrigations. All irrigations were terminated by September 15 and in addition 7.64 inches of rain fell during the period from April to September. In series 1 the plants remained in a vigorous growing condition and produced 3,301 pounds of seed cotton per acre. In series 2 the plants were stunted slightly, delayed in maturity, and produced 3,151 pounds per acre. In series 3 the plants were badly stunted and stopped growth, but put on a secondary or new growth following the first irrigation and produced 2,231 pounds. At the first picking on August 28, series 1 produced 25.8 percent more cotton than series 2 and 31.9 percent more than series 3; the total yield in series 1 was 4.5 percent greater than in series 2 and 32 percent greater than in series 3. These figures show the advantages of early irrigation on the earliness of the crop and of sufficient water on the total yield, although the first irrigation may be delayed without seriously decreasing the yield, provided the plants are not severely water stressed or the growth stopped. It has been found in the tropics, where the temperature is uniform throughout the year, that low moisture content of the pink bollworm's food induces the formation of hibernating larvae. Another series of tests was conducted to determine if continued high moisture content of the soil, plant, and bolls, as provided by continuous irrigation, would act as a practical control measure by eliminating or reducing the abundance of pink bollworm larvae entering the diapause. In series 1 irrigation was discontinued on July 11, causing some water stress of plants by August 1, although rains prevented severe water stress until late August. In series 2 irrigation was terminated July 31, or about the usual time most farmers discontinued watering cotton of similar age. In series 3 irrigations were continued at intervals of about 10 days until October 12, so that the soil was kept in an almost saturated condition and the plant in continuous growth.

Between August 25 and September 8, 100 percent of the green bolls were infested in all treatments with an average of 9.3, 19.1, and 21.1 larvae per green boll in series 1, 2, and 3, respectively, of which 6.7 percent, 8.0 percent, and 8.7 percent were estimated as being hibernating larvae. After harvest the number of hibernating larvae remaining in the field was estimated to be 35,816 per acre in the water-stressed series 1; 134,552 in the normally watered series 2; and 543,048 in the excess-watered series 3. Thus the continued irrigations throughout the growing season did not reduce the percentage of larvae entering hibernation early in the season but increased the total number of larvae entering hibernation under Presidio conditions, because of the larger population developing in the late green bolls. Ten varieties of cotton were tested in a randomized block in 1939 and a number of plant characters studied in relation to yield and pink bollworm damage. There was a difference of 600 pounds of seed cotton per acre between the highest and lowest yielding varieties, with an average increase of 371 pounds of seed cotton in favor of the eastern varieties over the Acala variety. Comparison of the 2 most promising eastern varieties with 2 strains of Acala cotton showed that 71.3 percent of the yield of the eastern varieties was gathered at the first pick, or in 141 days from time of planting, and 62 percent of the Acala strains at this time. The total number of pink bollworm larvae produced throughout the season was estimated at 664,332 and 1,817,516 per acre, respectively, for the 2 representative eastern varieties and 2 Acala strains, or 2.74 times more larvae for the latter. This is important from the standpoint of damage to the current crop, but even more important from the control angle is the larger number of worms produced late in the season, when most of the larvae go into hibernation. On September 23, the date of the last infestation record, a sharp decrease had occurred in the number of larvae per acre in the green bolls in the eastern varieties, while the number in the Acala was at its peak with 7.41 times more worms per acre than in the eastern varieties. This is accounted for by the much smaller number of late bolls per plant in the eastern varieties, owing to the determinate growth habits that cause them to set a crop of bolls and to practically stop growth and fruiting until most of the bolls have matured. The crop can also be harvested earlier and the fields cleaned earlier where the eastern varieties are used, thereby increasing the dead season when no food is available.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Ginning the new cotton crop.--In the subtropical Lower Rio Grande Valley planting of the cotton crop normally begins around the first of February. Control measures were inaugurated to retard the planting of cotton in an effort to create an effective host-free period for emerging pink bollworm moths and bring about a more uniform fruiting of the crop. We were aided by an extended drought and very little planting was done, except on irrigated acreage, prior to April 1. The completion of harvesting of the 1940 cotton crop in that area will be only slightly later than usual. Harvesting of the crop will probably be completed early in September, which is about normal. Owing to extremely hot weather, cotton in the Coastal Bend area began opening fast after the first of July, and the first bale was ginned on July 8. Sterilization of seed as ginned is required for all regulated counties in southern Texas. Through exceptionally fine cooperation of ginners with inspectors of this Division, all ginning and sterilization

equipment was in very satisfactory condition by the time the cotton season got under way.

Gin-trash inspection.--Inspection of the 1940 cotton crop began in the lower Rio Grande Valley of Texas on July 17, with one crew stationed in the San Benito-Brownsville area in Cameron County. A few days later machines were stationed at McAllen and Weslaco, in Hidalgo County, and before the close of the month additional machines were placed at Raymondville, in Willacy County, and at Matamoros, Mexico. Pink bollworms were taken at all machines. At the close of the period results of inspection showed that a much lighter infestation existed in Cameron County than was present in the 1939 crop and only 1 pink bollworm was taken from trash collected at Brownsville, where an extremely heavy infestation was present last season; however, there was a considerable increase in infestation in the eastern part of Hidalgo County over the 1939 season.

Okra inspection.--The first pink bollworm infestation in okra in the lower Rio Grande Valley was discovered early in August 1939, and as a result this commodity was placed under quarantine. Inspection of the 1940 spring okra began around the first of May and was continued throughout July, with no evidence of the pink bollworm having been found through the examination of 376,052 okra forms. Although okra shipments were discontinued toward the close of the month, inspections will be continued in an effort to determine at what time in the summer or fall okra may become infested. Toward the close of July, State Quarantine Proclamation No. 67-L was amended, prohibiting the growing of okra in the lower Rio Grande Valley between October 1 and December 31. During the 1939 season infestation was found in growing okra in every month from August to December, inclusive.

Subsoil stalk cutter for field clean-up.--For the last several months experiments have been carried on by this Division toward the development of a plow for the killing of cotton stalks which could be built economically and could be pulled by small work animals, such as are used in Mexico and by the Latin-Americans on this side of the Rio Grande. It is believed that such a plow has now been developed, and a number of these implements were built and placed at strategic points throughout the south Texas regulated area and in Mexico, in order that farmers might have an opportunity to observe these implements and try them out under actual field conditions. At the end of the period a number of tests had been made through the cooperation of several farmers, with very satisfactory results.

Vehicular inspection.--Operation of the Falfurrias road station, located on the principal highway leading out of the lower Rio Grande Valley, was begun by this Division on July 15 and during the remainder of the period inspection was maintained on a 24-hour basis. Toward the close of the month there was a considerable movement of cotton pickers out of the area. A total of 7,520 cars was inspected and 158 confiscations were made. Four road patrols operated on important highways leading out of the Panhandle area during July, in connection with quarantine enforcement in that area.

Survey for wild cotton in Cuba.--Pink bollworm infestation in southern Florida has been appreciably reduced in connection with the effort toward the eradication of its host plant, wild cotton, and it now appears likely that

this insect will be eliminated prior to the complete eradication of all wild cotton plants. Therefore, in an effort to determine the possibility of reinfestation from some outside source, it was believed advisable to make a survey with the object of determining actual conditions with reference to wild cotton in Cuba and the possible existence of the pink bollworm, this region being considered the most potential source of reinfestation. Consequently, a party of four inspectors of the Florida district left for Cuba on July 28 and the survey was completed the last of July. Wild cotton was found to be established at two locations near Batabano on the southern coast south of Havana. Following this finding, other locations of wild cotton were reported to our inspectors but, inasmuch as the cotton at the above locations was not in fruit, it was considered advisable to delay the trip into other areas until it was possible to make inspections for the pink bollworm if any plants should be found. Prior to the findings at Batabano, a considerable number of cotton plants was found in dooryards and along the roadsides in a number of locations, most of these being along the north-coast line. Inspection of this cotton showed a general pink bollworm infestation, bolls being practically 100-percent infested at Cardenas and La Isabela. From four to six worms were found in some of the bolls and many of the worms had pupated. Infestation was not established in the wild cotton found at Batabano.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Most feeding by imported cabbage worm done by last-instar larvae.--A series of laboratory experiments was performed by C. E. Smith and R. W. Brubaker, at the Baton Rouge, La., laboratory, to determine the quantity of food consumed by the larvae of Pieris rapae (L.). The larvae, kept in petri dishes, were supplied daily with a definite quantity of fresh cabbage leaves. As the surface area and weight of the leaf pieces supplied were recorded, the weight of fresh cabbage consumed each day was computed by determining the leaf area eaten. The mean temperature of the room in which the tests were carried on was about 70° F., with extremes of 65° and 75°. The following table shows for each instar of P. rapae the average duration, the average maximum weight, and the average total weight of food consumed. These averages represent data from 55 to 65 specimens in each instar.

Larval instar	: Average : :duration :	Average : :maximum weight:	: Total average weight :of fresh cabbage eaten
	: <u>Days</u> :	<u>mg.</u> :	<u>mg.</u>
First-----	: 3.1 :	0.7 :	6.9
Second-----	: 2.8 :	3.2 :	28.4
Third-----	: 2.4 :	11.6 :	68.2
Fourth-----	: 2.8 :	50.0 :	218.5
Fifth-----	: 5.5 :	190.8 :	1,422.0
Total--	: 16.6 :	-- :	1,744.0

The data show that 81.5 percent of the cabbage required for development of the imported cabbage worm was consumed during the fifth instar. They also indicate the necessity for controlling larvae of this insect on cabbage before they reach the fifth instar. Feeding into the head of a cabbage by one of these caterpillars is sufficient to prevent marketing the head as U. S. Grade No. 1.

Productiveness of tobacco flea beetle in tobacco plant beds reduced by cultural operations.--J. U. Gilmore and associates, of the Oxford, N. C., laboratory, have found that several methods of destroying tobacco in plant beds are effective in reducing the numbers of Epitrix parvula (F.) that mature and emerge in tobacco plant beds, when these methods are applied as soon as transplanting to the field is complete and before the first generation of beetles begins to emerge. Where the plants were allowed to remain undisturbed after transplanting was completed an average of 432.6 beetles per square foot of plant bed emerged during June. Where similar areas were thoroughly broken with a plow an average of 247.2 beetles per square foot emerged. Similar areas that were plowed and harrowed produced an average of 154.4 beetles per square foot of plant bed during this period. The most effective treatment was that of pulling all of the plants by hand, then scraping the surface of the bed with a hoe. From areas treated in this manner an average of but 130.7 beetles per square foot emerged during June. As a general farm practice, very few of the plant beds are destroyed after transplanting is completed.

Thrips population increases and decreases rapidly on vegetables.--Field studies conducted during the spring of 1940 by C. B. Wisecup, at the Sanford, Fla., laboratory, resulted in valuable information concerning the seasonal abundance and distribution on a number of vegetable crops of one of the species of tropical flower thrips (Frankliniella cephalica D. L. Crawford) and the onion thrips (Thrips tabaci Lind.). The studies showed that populations of these 2 common species of thrips varied greatly on different vegetables; that the time of their peaks of abundance varied greatly; and that the increases and decreases in infestation occurred rapidly. For example, an infestation of 4 thrips per blossom on beans late in March increased to 60 by April 15. Of this population T. tabaci never constituted more than 5 percent. On Bidens an average infestation of 10 thrips per blossom during the first week in April increased to 40 in 1 week. On squash there was an average of 10 thrips per blossom late in April, 25 percent of which were the T. tabaci, which early in May had increased to 30 per blossom. This infestation declined to 1 thrips per blossom by June 15. The onion thrips rapidly disappeared on squash in early May. The thrips infestation on celery, composed of F. cephalica and T. tabaci in about equal numbers, never exceeded an average of 120 thrips per 10 sweeps of an insect net. The onion thrips seemed to migrate from harvested celery fields to nearby peas and they appeared to breed rapidly on the peas, there being as many as 15 per blossom by the end of March.

A tropical flower thrips less destructive than onion thrips in Florida.--Laboratory tests conducted by C. B. Wisecup, of the Sanford, Fla., laboratory, substantiated field observations that most vegetable flowers can tolerate high infestations of one of the species of tropical flower thrips, Frankliniella cephalica D. L. Crawford, because feeding injury by this insect is confined primarily to the highly pigmented portion of the flower. The onion thrips seemed to blast many of the blossoms of peas and the spring crop was so badly stunted from thrips damage that it was a complete failure, notwithstanding the continued cool weather. Other observations indicated that the blossom drop of peppers was not caused by injury from thrips; that squash blossoms probably may not be damaged, even by excessive numbers of thrips, and that thrips caused no damage to strawberries.

Plant bugs on lettuce controlled by insecticides.--K. B. McKinney, of the Phoenix, Ariz., laboratory, reports that derris-sulfur-talc and paris green-sulfur-talc dusts controlled the plant bug Corizus sp. in small experimental plots of lettuce being grown for seed. In 1 test 3 applications of a derris dust containing 0.5 percent of rotenone in a mixture of 1 part of sulfur to 3 parts of talc gave 94 percent control of the adults and 91 percent control of nymphs where there was an average of 857 nymphs and 221 adults per plant on the undusted plots. In the same test a mixture containing 1 part of paris green to 4 of sulfur and 5 of talc gave 93-percent control of the adults and 91-percent control of the nymphs. The derris-sulfur mixture was applied at a rate of 60 pounds per acre per application, and the paris green-sulfur mixture at the rate of 49 pounds. During the period of these tests there were decided increases in the infestations of nymphs and adults of Corizus sp. on the untreated plots in the series. Applications at intervals of 5 days or less may be necessary to combat reinfestation of the lettuce brought about by the influx of this plant bug from outside sources and the rapid rate of its development.

INSECTS AFFECTING MAN AND ANIMALS

Dove to direct work in Southeastern States.--W. E. Dove returned to research work in this Division in the latter part of July, after having been engaged in the direction of screwworm, grasshopper, and chinch bug control for the last 5 years. Mr. Dove is to have general direction of the laboratories of the Division located in the Southeastern States and will be in immediate charge of the Gulf coast tick and "dog fly" (Stomoxys calcitrans) investigations, with headquarters at Panama City, Fla.

Screwworms becoming abundant in parts of Texas.--D. C. Parman and associates, reporting on a survey of Cochliomyia americana C. & P., state that there has been a general decrease of the screwworm along the lower Balcones escarpment in western Texas during July and a general increase on the upper escarpment, especially on the eastern part. It has been supposed that this year screwworm flies reached the area on the eastern escarpment that is heavily populated with deer early enough to build up the high infestation there in fawns, and this has been substantiated by inquiry.

Trap automatically baited with flies captures screwworm flies.--H. M. Brundrett, in discussing the development of control traps, reports that the inverted-cone trap with windmill stirrer, which empties the flies into the bait tub to replenish the bait, has made good catches during the month and has taken approximately as many C. americana and other flies as other traps in the vicinity, without addition of other baits than flies and water. This trap was started on April 2 with two rabbits and 1½ gallons of citrated blood.

Diphenylamine appears superior in protecting wounds from screwworms.--From the studies of H. E. Parish, at the Menard, Tex., laboratory, it appears that diphenylamine is slightly superior to either diphenylene oxide or a-nitronaphthalene in protecting wounds from screwworm reinfestations, but the numbers of wounds treated at each interval in both the infested and non-infested areas are too few to draw conclusions.

Results of tests with "smears" against screwworms.--Although incomplete, the studies of Roy Melvin and associates at the Menard, Tex., laboratory indicate (1) that the addition of lanolin to a smear decreases the toxicity of benzol in screwworm larvicides and wound protectors; (2) the toxicity of benzol is reduced by excessive amounts of diphenylamine; (3) the addition of zinc oxide to benzol containing smears "steps up" the toxicity of the smear; and (4) several of the mixtures tested are effective in killing the largest larvae of Cochliomyia americana, even in bloody wounds in cattle, but they do not give the same protection to the wounds from reinfestation that is effected by the regular treatment of diphenylamine.

Effectiveness of pyrethrum emulsions on mosquito larvae influenced by temperature.--W. W. Yates, of the Portland, Oreg., laboratory, reports that tests with larvae of Aedes vexans Mg. and A. lateralis (Mg.) have shown that the toxicity of pyrethrum emulsions is decreased by low temperatures. For example, kills of 99 percent were obtained at 78° to 80° F., 68 percent at 58° to 60°, and 50 percent at 45° to 50°. A temperature of 56° to 60° is often encountered in mosquito-breeding waters in the Portland area. It is therefore possible that the poor kills frequently reported with pyrethrum emulsions may be due to this factor.

FOREIGN PLANT QUARANTINES

Customs help again gets the fruitfly.--M. E. Winters, customs inspector at Del Rio, intercepted a mango in a paper sack on June 8 and when the plant quarantine inspector came on duty watched him open the bag. Mr. Winters noted that an insect from the bag hit the screen. It proved to be Anastrepha ludens (Loew). This is just one of the many instances where the wholehearted cooperation of the customs personnel has materially aided in preventing entry of unwanted pests.

Hawaiian avocados infested with Mediterranean fruitfly.--Examination of 4 large avocados found in the personal baggage of a passenger arriving at San Francisco from Honolulu on the S.S. Lurline on June 5 showed one of the fruits to be heavily infested with larvae of the Mediterranean fruitfly. From this single fruit 21 large, nearly mature larvae were removed. The owner of the fruits was destined to Sutter County in the heart of the peach-producing area in California. All 4 fruits were destroyed in the galley steamer on board ship.

Formosan termites in roots of palm from Japan.--Inspection of 250 root stalks of a small palm, Cycas revoluta, arriving at San Francisco as passenger baggage on one of the large Japanese liners from Japan, destined for planting in Berkeley, Calif., disclosed numerous live soldiers and workers of the Formosan termite (Coptotermes formosanus Shir.) working in several of the roots. This is one of the most destructive species of termites known in the Orient and in the Hawaiian Islands and is not known to occur here. Its tropical nature might preclude its becoming established, but this is a chance we cannot afford to take. In this instance the termites had almost completely hollowed out the stalks in which they were found working. The infested stalks were both thoroughly hand-cleaned and subjected to methyl bromide fumigation under vacuum and the effectiveness of the treatment was checked before the plants were released.

Entomological interceptions of interest.--A living larva of the trypetid Anastrepha mombinpraeoptans Sein was intercepted at Baltimore, Md., on July 15, 1940, in a mango in quarters from Haiti. Sixteen larvae of the trypetid Anastrepha suspensa (Lw.) were intercepted at New York on June 30, 1940, in grapefruit in stores from Haiti. Nine living larvae of the Mediterranean fruitfly (Ceratitidis capitata Wied.) were taken at San Pedro, Calif., on July 3, 1940, in a mango in baggage from Hawaii. A living specimen of the curculionid Conotrachelus aguacatae Barber was taken at Brownsville, Tex., on June 20, 1940, in a seeded avocado in baggage from Mexico. Fourteen larvae of the pink bollworm (Pectinophora gossypiella (Saund.)) were intercepted at New York on July 10, 1940, in an okra pod in stores from Brazil. One living adult of the curculionid Cossonus excavatus Boh. was found at Laredo, Tex., on June 24, 1940, on pineapple in cargo from Mexico. An adult helodid Scirtes oblongus Guer. was intercepted at El Paso, Tex., on June 7, 1940, on pineapple in cargo from Mexico. Eight living larvae of the curculionid Palaeopus costicollis Mrsh. were found in sweetpotatoes in stores at New York on July 11, 1940, from the French West Indies. Specimen of the coccid Leucaspis japonica (Ckll.) was taken at Boston, Mass., on June 9, 1940, on cherry shrub in crew's quarters from Japan. Specimens of the coccid Targionia hartii (Ckll.) were taken at Boston, Mass., on June 7, 1940, on yams in baggage from Barbados. A living adult of the curculionid Parasomus jansoni Sharp was found at Brownsville, Tex., on July 12, 1940, in the cabin of an airplane from Cristobal, Canal Zone. Living specimens of the bostrichid Heterobos trychus aequalis (Waterh.) were taken at Philadelphia, Pa., on June 18, 1940, in packing cases in cargo from India.

Pathological interceptions of interest.--Plant disease interceptions for which determinations were received during the month included: Ascochyta caricae Pat. on papaya fruit in baggage from Brazil found at New York on July 23 (see P. Q. C. A. News Letter dated May 1, 1932, p. 4); galls of Bacterium tonellianum Ferraris on oleander cutting in baggage from Mexico on July 17 at Laredo; Cercospora odontoglossi Prill & Del. on Odontoglossum sp. from England on April 30 and May 17 at Washington; Cerebella andropogonis Ces. on Paspalum dilatatum seed in mail from Australia on May 21 at Baltimore; Coryneum microstictoides Sacc. & Penz. on Paeonia montan in mail from France on May 3 at San Francisco; a disease tentatively determined as Cylindrosporium colchici Sacc. on seed of Colchicum autumnale in cargo from Yugoslavia on February 15 and from Hungary on February 26 at New York; Eutypella cocos Ferd. & Winge on coconut husks in cargo from Canal Zone on March 21 at New York; Gloeosporium affine Sacc. on Dendrobium chrysotoxum in mail from Thailand (Siam) on April 22 at San Francisco and on Epidendrum sp. in mail from Costa Rica on June 5 at Seattle; G. cymbidii Verpl. on Cymbidium pauwelsii in mail on May 6, and on Cymbidium sp. in cargo on April 17 from Japan at Seattle; G. laeliae P. Henn. on Laelia purpurata in baggage from Brazil on February 2 at San Francisco; Gloeosporium sp. (unlike G. oncidii Oud.) on Oncidium varicosum in air express from Brazil on February 8 at San Francisco; Gloeosporium sp. (with spores unlike those of G. cypripedii Verpl., the only species reported on Cypripedium) on Cypripedium callosum in mail from Thailand on February 6 at San Francisco; Glomerella sp. (no species reported on the host genus) on Stenospermation sessile in mail from Guatemala on May 22 at San Francisco; Leptosphaeria musarum S. & H. on Musa sp. (under special permit) in express at Washington

on January 6; Macrophoma oncidii P. Henn. on Cattleya sp. in baggage from Mexico on April 1 at Brownsville; Ophiobolus sp. (not O. graminis Sacc.) on grass in cargo from Liberia on May 1 at New York; Phyllosticta sp. (unlike any species described on orchids) on Schomburgkia humboldtii in baggage from Venezuela on May 16 at New York; Phytophthora sp. on string beans in baggage from Mexico on July 11, 22, and 23 at El Paso; Physalospora japonica Togashi on Camellia japonica in mail from Japan on February 14 at San Francisco; Puccinia cesatii Schroet. on Andropogon annulatus from Egypt in stores on April 19 at New York; Trullula olivascens Sacc. on Paeonia moutan in mail from France on May 3 at San Francisco; Uredo incomposita Kern on Eleocharis interstincta in cargo from Haiti on July 20 at New York; and Ustilago bromivora Fischer de Wald. on Bromus tectorum in baskets of cipolini in cargo from Italy on February 23 at New York.

DOMESTIC PLANT QUARANTINES

Grasshopper-survey conference.--Plans and procedures for conducting the fall survey of grasshopper adults and egg beds were outlined in a meeting held in Denver on July 22 when the State leaders' committee met with field, area, and survey supervisors and Bureau workers from Washington. Members of the committee present were T. L. Aamodt, chairman, Minnesota; George G. Schweis, Nevada; Sam C. McCampbell, Colorado; W. P. Flint, Illinois; F. Gray Butcher, North Dakota; H. B. Mills, Montana; and E. G. Kelly, Kansas. Bureau representatives from Washington included Lee A. Strong, C. M. Packard, B. M. Gaddis, and R. A. Sheals. J. R. Parker, in charge of the Bozeman, Mont., laboratory of Cereal and Forage Insect Investigations, was also present.

Grasshopper-control operations near close.--Bureau-paid grasshopper-control activities were terminated for the season in North Dakota, South Dakota, Montana, Oklahoma, and Texas in July. A sufficient number of employees and laborers were being retained to concentrate the equipment and materials.

New infestation of long-winged grasshopper in Colorado.--A rather light but previously unreported infestation of Dissosteira longipennis Thos. was found the latter part of July in Kiowa County, Colo., extending over about 196 sections of land into Greeley County, Kans. Other areas in which infestations of the pest had previously been reported in Colorado were again scouted during the month and only a very scattered adult population was found. There was no indication of banding for egg-laying purposes.

'Hopper situation in Montana and Minnesota.--In the Great Falls, Mont., area harvesting of winter wheat was practically completed by the close of July with little damage done to the crops, owing to the combined control activities of farmers, counties, and State and Federal workers. Across the international boundary where the 'hopper infestations were no greater than those in Montana, damage ranging from 50 to 100 percent was noted over extensive crop areas. In this section of Canada 100-percent defoliation of such ornamental plants as Caragana was noted. In the Red River Valley of Minnesota excellent control has been reported and the harvesting of grain was well under way in July. Adult 'hoppers are milling about in that area but no heavy flights have been reported. Bait demands subsided the latter

part of July, although mixing stations in two counties were still operating on a 16-hour schedule. Nearly 7,000 tons of dry-bait materials had been distributed to farmers in three Minnesota counties to the close of July.

Grasshopper-baiting activities in Nebraska.--Activities were increased in southeastern Nebraska and also the northeastern part of the State when hot, dry weather in July dried out native vegetation. The grain had been harvested and farmers became aware that the 'hoppers had moved into the cornfields. Crops in western Nebraska were severely damaged by the extreme heat and lack of rain during the month.

Grasshopper development.--Hatching of a second generation of Melanoplus mexicanus Sauss. was reported in the Texas-Oklahoma-Kansas-Colorado area the middle of July with third-instar nymphs present. In Baca County, Colo., desiccation is causing a heavy reduction in the number of viable eggs in pods, as evidenced by a 90-percent destruction in one field in which intensive examinations were made. In Pueblo and Las Animas Counties, Colo., 'hopper mortality caused apparently by a fungus disease was reported. As many as 10 'hoppers per square yard were killed by the fungus in Pueblo County.

Mormon cricket-control work nearing completion.--Mormon cricket control had been completed in almost all areas of the cricket-infested States by the close of July. Operations on a greatly reduced scale were in progress in the vicinity of Mountain City, Nev.; in Baker and Malheur Counties, Oreg.; in Clark, Owyhee, and Washington Counties, Idaho; and in Crook and Sheridan Counties, Wyo. Surveys of adult crickets have been completed in Utah, Washington, Montana, and in several counties in Idaho, Oregon, Wyoming, and Nevada. The egg survey was in progress in several of the States at the close of the month.

Chinch bug control.--Migrations of chinch bugs in the heavily infested States of Indiana, Illinois, Iowa, Missouri, Nebraska, and Oklahoma reached a peak about July 15, after which the corn growth had developed to a point where the bugs caused little damage. The last orders for creosote were filled on July 29 and were shipped to two points in Illinois near the northern periphery of the infested area. A total of nearly 2½ million gallons of creosote was shipped between June 15 and July 29 to 167 counties in 7 States, almost 60 percent of it going to 45 counties in Iowa. The value of fall surveys is apparent, as indicated by the counties supplied with creosote, which followed closely the predictions of the Federal-State survey conducted last fall, the most heavily infested area being within approximately a 150-mile radius of the area where the States of Iowa, Nebraska, Kansas, and Missouri join.

White-fringed beetle control.--The weather conditions prevailing over practically all the infested areas in July were more favorable to effective control work than had been the case in June. The effective application of control measures coincided with what appeared to be the peak of emergence in the Florala and Monroeville, Ala., areas and a second smaller peak in the vicinity of New Orleans. Good kills were reported from nearly all areas. Scouting of the Central of Georgia and the Atlantic Coastline Railroad yards and rights-of-way for 22 miles resulted in finding no beetles.

Phony peach and peach mosaic inspection.--The inspection of the environs of nurseries and budwood sites for the phony peach and peach mosaic diseases having been completed, the cooperative project activities in July were primarily concerned with the inspection of properties formerly found infected and those adjacent thereto. In some areas in California and Colorado second inspections for the season were made. Inspections were completed in 109 counties in 14 States. The inspection was conducted by 104 inspectors, of which 60 were Bureau employees, and 44 employed by cooperating States. Inspections were completed in Illinois and Tennessee during the month. Inclement weather during the first half of July interfered somewhat with inspection for the phony disease. However, these summer rains in Texas kept the foliage in a vigorous growing condition thereby extending the period during which an accurate diagnosis of peach mosaic could be made. It has been reported that all mosaic trees found in the Ontario district of San Bernardino County, Calif., have been removed, this being the first time such progress has been reported.

Phony peach disease being eradicated from Illinois.--Inspections for the phony peach disease have been completed in Illinois for the season, with the result that no disease was found in the State. Four years ago phony peach infection was known to exist in 13 counties in the State. Last year the disease had been reduced to but 1 county.

Transit inspection.--As is usual for this time of the year, plant shipping fell off considerably through all terminals and the shipping of cut flowers showed a marked increase. The movement of refrigerator cars of fruits and vegetables to points in the Middle West from the area of heavy Japanese beetle flight has been lighter than in former years, owing to the excellent growing conditions in the Midwest areas. However, 192 cars of such produce were inspected at Chicago. Inspection of cut-flower shipments at Pittsburgh resulted in the discovery of live insects including 2 lepidopterous larvae in a shipment of cut flowers moving from Virginia to Ohio. Inspectors at New York City intercepted shipments containing live rose chafers and a coleopterous larva. In the month's work at the various stations, interceptions were made of 42 violations of the gypsy moth quarantine, 102 violations of the Japanese beetle quarantine, and 6 violations of State quarantines relating to this beetle.

Transit inspection at Buffalo.--The importance of the Buffalo station, which is being operated during the summer months for the first time, is indicated by the number of violations that are being intercepted at that point each month. Considering that the station is operated by only one man, it compares favorably with the other stations in the northeastern area.

CONTROL INVESTIGATIONS

Effect of poisons on glycogen counts and indices.--At the Beltsville, Md., laboratory, J. Franklin Yeager and Sam C. Munson report that the glycogen count and glycogen index of the blood were altered when arsenical and fluoride insecticides and mercuric chloride were administered as stomach poisons to southern armyworm larvae. The glycogen index is the total percentage of blood cells that contain glycogen inclusions. The

glycogen count consists of the percentage of cells containing glycogen inclusions, grouped according to whether the cells contained 0, 1, 2, 3, or more than 3 glycogen inclusions. In the unpoisoned controls, the glycogen count had the following form: $0 > 1 > 2 > 3 < 3+$, with respect to numbers of cells. It was found that the $3+$ class was greater than the 3 class because of a certain type of blood cell which contained numerous, very small glycogen inclusions. This form of the glycogen count tended to persist as the glycogen inclusions disappeared from the cells in the poisoned larvae, i. e., as the glycogen index tended to approach zero. As the glycogen index increased in the glucose-fed, unpoisoned control larvae, the glycogen count changed in such a way that its usual form was maintained but its peak shifted to the right from class 0 to class 1. Average glycogen counts from the fore and the hind ends of ligatured control larvae had the same form. The effects on glycogen count and glycogen indices that followed arsenical, fluoride, and mercuric chloride administration were not observed when nicotine, nicotine bentonite, nicotine peat, rotenone, pyrethrum, and phenothiazine were used.

INSECTICIDE INVESTIGATIONS

A new percolator.--The investigation of plant materials for possible insecticidal properties requires apparatus suitable for the percolation of the ground plants in quantities ranging from several hundred grams to several kilograms. A simple, automatic continuous apparatus meeting these requirements has been constructed by M. S. Schechter and H. L. Haller and used successfully for some time in the laboratory. The apparatus is inexpensive and, for the most part, uses standard laboratory equipment.

Composition of a commercial geraniol.--Although commercial geraniol has been used for a number of years in baits for the Japanese beetle, no detailed chemical studies of this material have been reported. H. A. Jones and H. L. Haller have recently completed an examination of a sample of geraniol which had previously been found by W. E. Fleming, of the Division of Fruit Insect Investigations, to be unusually attractive to the beetle. The product contained about 35 percent of the alcohol geraniol, with smaller amounts of citronellol and esters of both of these. Over 25 percent of terpenes, sesquiterpenes, and sesquiterpene alcohols were present. About 1 percent of eugenol was found. The principal constituents of this commercial geraniol have been prepared by these workers in pure condition. These, together with commercial fractions of Java citronella oil obtained by R. D. Chisholm, of the Moorestown, N. J., laboratory of this Division, are being tested this season by W. E. Fleming for attractiveness to the Japanese beetle.

Composition of "Genecide."--Entomologists and fruit growers, especially in the States of Washington, Oregon, and California, have been interested in the promising results obtained in the control of codling moth larvae by the application of Genecide in the form of a spray. Circular 136, issued July 1939 by the Connecticut Agricultural Experiment Station, states that Genecide contains 55.8 percent xanthone, 43.3 percent clay, and the remainder water and a trace of phenol. This same circular also gives the analysis of Elgetol, Dowspray Dormant, and a number of other proprietary insecticides whose composition is not generally known.

Imports of rotenone plants steadily increasing.--The following data show the growth in the consumption of derris and Lonchocarpus (barbasco, cubo, and timbo) in the United States:

Plant material	1936	1937	1938	1939	1940 ^{1/}
	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>
Crude cube and timbo root-----	704,120	576,151	590,854	1,907,194	1,130,879
Powdered cube and timbo root-----	1,124,936	1,263,773	1,735,995	896,640	327,589
Crude derris root:	510,337	572,652	746,661	2,335,048	1,826,657
Total-----	2,339,393	2,412,576	3,073,510	5,138,882	3,285,125

^{1/} First 6 months.

BEE CULTURE

Carbohydrate metabolism of developing worker honeybee.--R. M. Melampy, of the Southern States Bee Culture Laboratory, University, La., reports a marked increase in total carbohydrate and glycogen during the development of the honeybee. The maximum storage of both of these materials occurs between the fifth and sixth days, which is approximately the end of the larval-feeding period and the time the cell is sealed. The total carbohydrate at this time is 100 mg. and the glycogen 68 mg. per gram of tissue; however, 12 days later the total carbohydrate has decreased to 9 mg. and the glycogen to 0.9 mg. per gram. At the time of emergence a very small amount of carbohydrate reserve remains. In addition to glycogen, there is in the tissues of the immature honeybee a reserve carbohydrate which is convertible, by acid hydrolysis, to reducing sugar. Free reducing sugar is found in the tissues of larval and pupal honeybees.

Changes in color of nectar.--Geo. H. Vansell, of the Pacific States Bee Culture Laboratory, Davis, Calif., reports that certain nectars, which are colorless at the time of secretion, and sirups take on color when stored in dark combs from certain locations. As the sugar concentration of sirup was increased the rate of darkening decreased very noticeably. The familiar change in water, to a dark amber color, with the soaking of old combs is perhaps a result of this coloring phenomenon. Just what is the source of this color is not yet clear. The effect on color in nectar, sugar sirup, and water^{2/} by exposure^{1/} to used bee comb in the laboratory experiments at Davis^{2/} was as follows:

^{1/} The checks stored in glass at 70° to 80° F. were still colorless after 3 months.

^{2/} The same materials exposed in an old comb from the fireweed area changed very slightly.

Material	:Time : in : cells:	:Orig-: : inal : : color:	Final : color :	Remarks
	:Hours :	:	:	
Fuchsia nectar-----	8	:None	:Pale yellow	: Hand collected
Do-----	17	: do.	:Yellow	: Do.
Poinsettia nectar-----	24	: do.	: do.	: Do.
Orange nectar-----	24	: do.	: do.	: Do.
30-percent invert sirup:	10	: do.	:Pale yellow	: Sucrose, water, and
	:	:	:	: tartaric acid boiled
	:	:	:	: 10 minutes
	:	:	:	:
Do-----	24	: do.	:Yellow	: Do.
Distilled water-----	24	: do.	:Amber	:

IDENTIFICATION AND CLASSIFICATION OF INSECTS

First-instar larvae of Pantomorus readily distinguishable.--Recently a large lot of first-instar larvae of Pantomorus leucoloma (Bbh.) was received from the Division of Cereal and Forage Insect Investigations, and there are now available for study, in the collection of the National Museum, adequate samples of first-instar larvae of three species of Pantomorus, namely, P. leucoloma (Bbh.) from Florala, Ala.; P. peregrinus Buch. from Saucier, Miss.; and P. godmani (Cr.) from Anson County, N. C. A cursory examination of specimens from these samples shows the first-instar larvae to be as readily separable as the mature larvae and pupae.

A stinging ant frequently intercepted at ports of entry.--An ant, commonly intercepted in plant shipments from tropical America, is a species of Wasmannia, apparently rochai Forel. A very close relative of this ant, Wasmannia auropunctata (Roger), is now established in a number of localities in Florida, where it is proving to be a pest on account of its relationship to honeydew-excreting insects and its painful stings. There seems to be no reason why rochai could not become established in the subtropical parts of the United States and our insular possessions and thus prove as annoying a pest as auropunctata.

Species and subspecies of fleas in North America.--According to a manuscript which is approaching completion, by H. E. Ewing and Irving Fox on the fleas of North America, 61 genera, 14 subgenera, 209 species, and 63 subspecies of Siphonaptera have been reported as occurring on the North American Continent. Over half of these forms have been described from the western part of the United States, an area unusually rich in its flea fauna. It is believed, however, that not more than half of the species of fleas occurring in North America are known.